



Systems of Ordinary Differential Equations > Linear Systems of Three and More Equations

4. $x'_t = (a_1 f + g)x + a_2 f y + a_3 f z$, $y'_t = b_1 f x + (b_2 f + g)y + b_3 f z$, $z'_t = c_1 f x + c_2 f y + (c_3 f + g)z$.

Here, $f = f(t)$ and $g = g(t)$.

The transformation

$$x = \exp \left[\int g(t) dt \right] u, \quad y = \exp \left[\int g(t) dt \right] v, \quad z = \exp \left[\int g(t) dt \right] w, \quad \tau = \int f(t) dt$$

leads to the system of constant coefficient linear differential equations

$$u'_\tau = a_1 u + a_2 v + a_3 w, \quad v'_\tau = b_1 u + b_2 v + b_3 w, \quad w'_\tau = c_1 u + c_2 v + c_3 w.$$